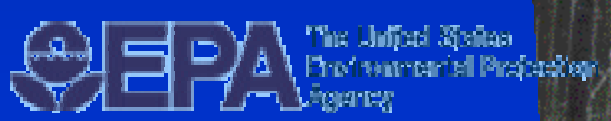
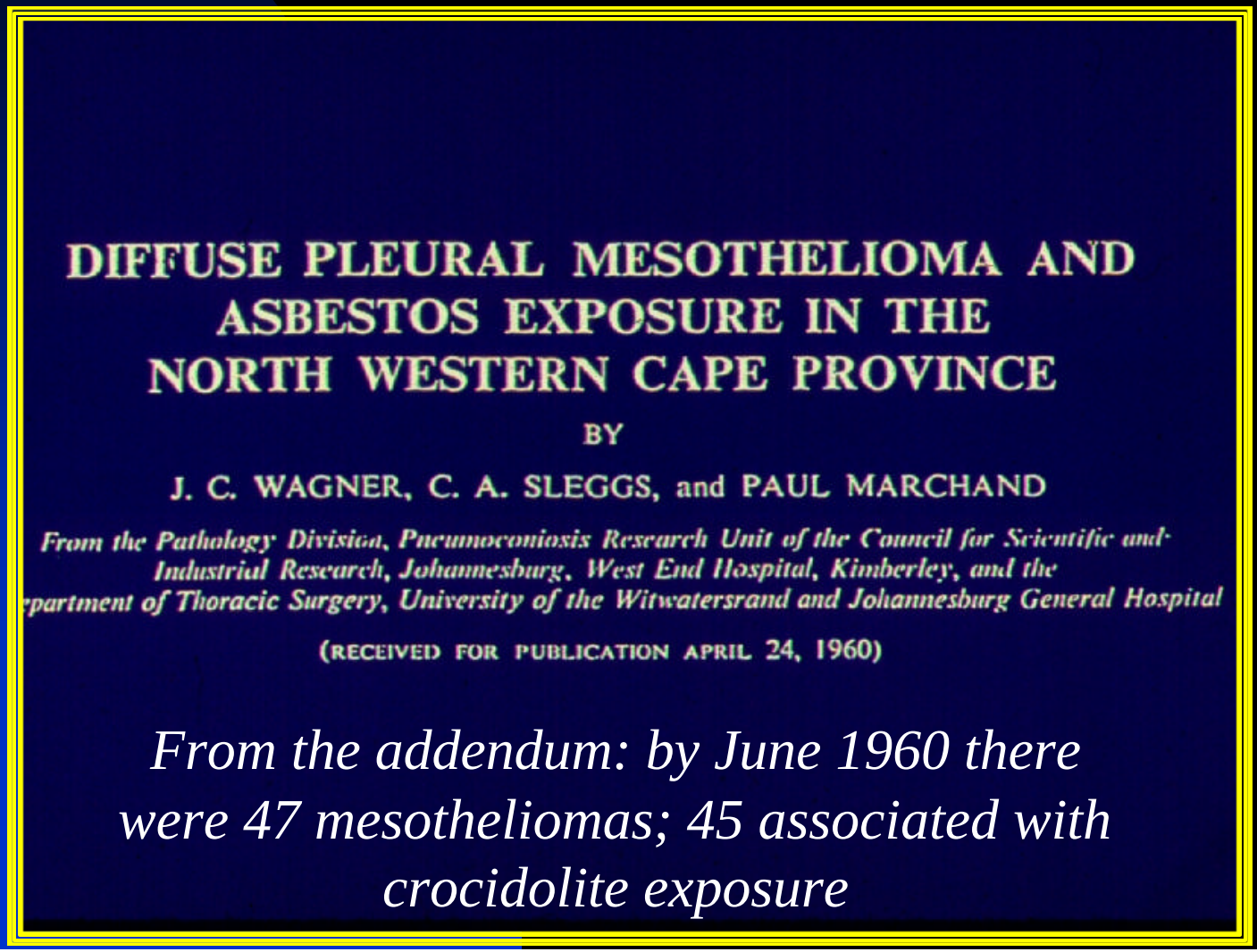
# Mineralogy and Exposure Assessment

## Introduction: Bruce Case




# Dedicated to the memory of Chris Wagner



DIFFUSE PLEURAL MESOTHELIOMA AND ASBESTOS EXPOSURE IN THE NORTH WESTERN CAPE PROVINCE

BY

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(RECEIVED FOR PUBLICATION APRIL 24, 1960)

*From the addendum: by June 1960 there were 47 mesotheliomas; 45 associated with crocidolite exposure*

**"In failing to take more seriously the paper published by Wagner et al. in 1960 the world made a costly mistake"**

**- McDonald JC 1995**

# What is now generally accepted

- regarding asbestos mineralogy ?
- regarding exposure assessment for “asbestos”?
- We need to step back from these to more general questions first

# What *is* “asbestos”?

- John Addison will tell us!

*But…*

- IARC 1996: “ “Asbestos” is often inappropriately used as a generic, homogeneous rubric, and even when an asbestos fibre type is specified, its source is rarely stated.”

# Defining “asbestos” (continued)

- Wagner, ILO/ NIOSH, 1990:
- asbestos may be defined as “a group of fibrous minerals that can be split longitudinally and have commercial uses”.
- Wagner also noted that “the term asbestos was originally used for chrysotile:

# Defining “asbestos” (continued)

- …“If this had been maintained and the other minerals referred to as the amphibole fibres, the present confusion in assessing the risk hazard would not have occurred”

- Wagner JC. (1990) (NIOSH) Publication No. 90-108, Part I, pages 22-24.

***BUT...***

Geolib® Standard Report

Mineral Class: VIIIca Silicates

(Inosilicates – **Amphibole**)

Number of Minerals: 38

**ACTINOLITE** **ANTHOPHYLLITE** **ARFVEDSONITE**
**BARROISITE** **CROSSITE** **CUMMINGTONITE** **ECKERMANNITE**
**EDENITE** **FERRIKATOPHORITE-(?)** **FERRIWINCHITE** **FLUOR-FERRO-LEAKEITE** **GEDRITE** **GRUNERITE** **HASTINGSITE**
**KATOPHORITE** **KORNITE** **LEAKEITE** **MAGNESIO-ANTHOPHYLLITE** **MAGNESIO-ARFVEDSONITE**
**MAGNESIOCLINOHOLMQUISTITE** **MAGNESIOCUMMINGTONITE** **MAGNESIOFERRIKATOPHORITE** **MAGNESIOGEDRITE**
**MAGNESIOKATOPHORITE** **MAGNESIORIEBECKITE** **MANGANO-GRUNERITE** **MANGANOCUMMINGTONITE** **NYBOITE-(?)**
**PARGASITE** **POTASSIUM-FLUOR-RICHTERITE** **RICHTERITE**
**RIEBECKITE** **SODIUMANTHOPHYLLITE** **SODIUMGEDRITE**
**TREMOLITE**

**TSCHERMAKITE** **UNGARETTIITE**

# Thus the questions must be asked:

1. Which physical or mineralogical differences ***CAN OR SHOULD*** form the basis for categorization?
2. Can these categories be reproducibly distinguished (AND separated)?
3. “asbestiform” ?, “cleavage fragments” ?? “transitional fibers” ???
4. Which **types** and **dimensions** of fibers are important to enumerate? (implies EM, so…)

# Ideally risk assessors could agree upon well-defined parameters of concern:

***Which*** **mineral categories (e.g. fiber types)**

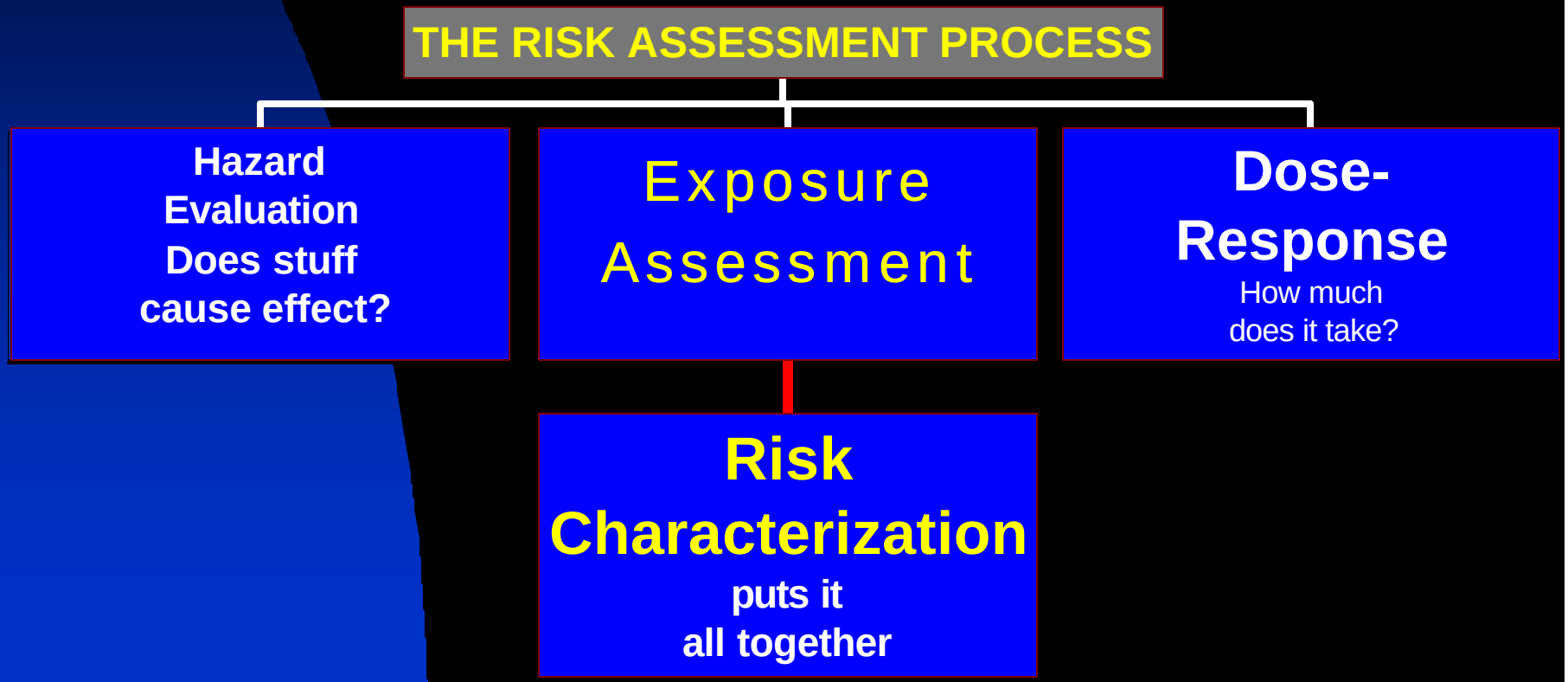
**cause which disease(s) (or not!!)**

**at *which***

- **Exposure (-→ dose)**
- **Length (range?) Width (range?)**
- **Chemistry, crystallography…**

# So much for mineralogy; where does "exposure assessment" fit in?

***Exposure assessment is a part of risk assessment***



# The first part of "exposure assessment" is *measurement*

1. **WHAT** do we measure?
2. **WHERE** do we measure? (air? "settled dust"? Materials which may *contain* the asbestos? Lung tissue?)
3. **HOW** do we measure? (instruments? Procedures? e.g. NIOSH 7400/7402)?

# The first part of "exposure assessment" is *measurement (continued)*

**4. How do we DEFINE and EXPRESS THE RESULTS?**

**Example: Detection limits:**

**Too sensitive – "positive" in this room – so what?**

**Too insensitive – can miss exposures of interest.**

# From exposure to dose

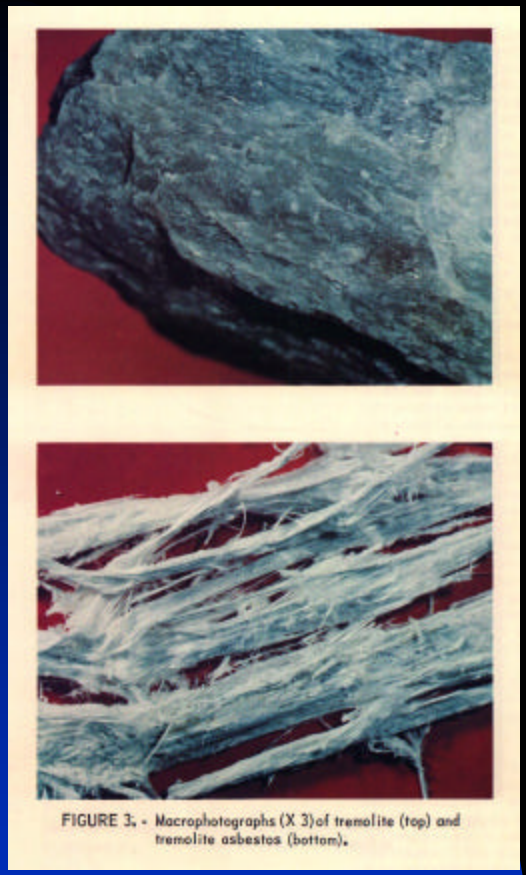
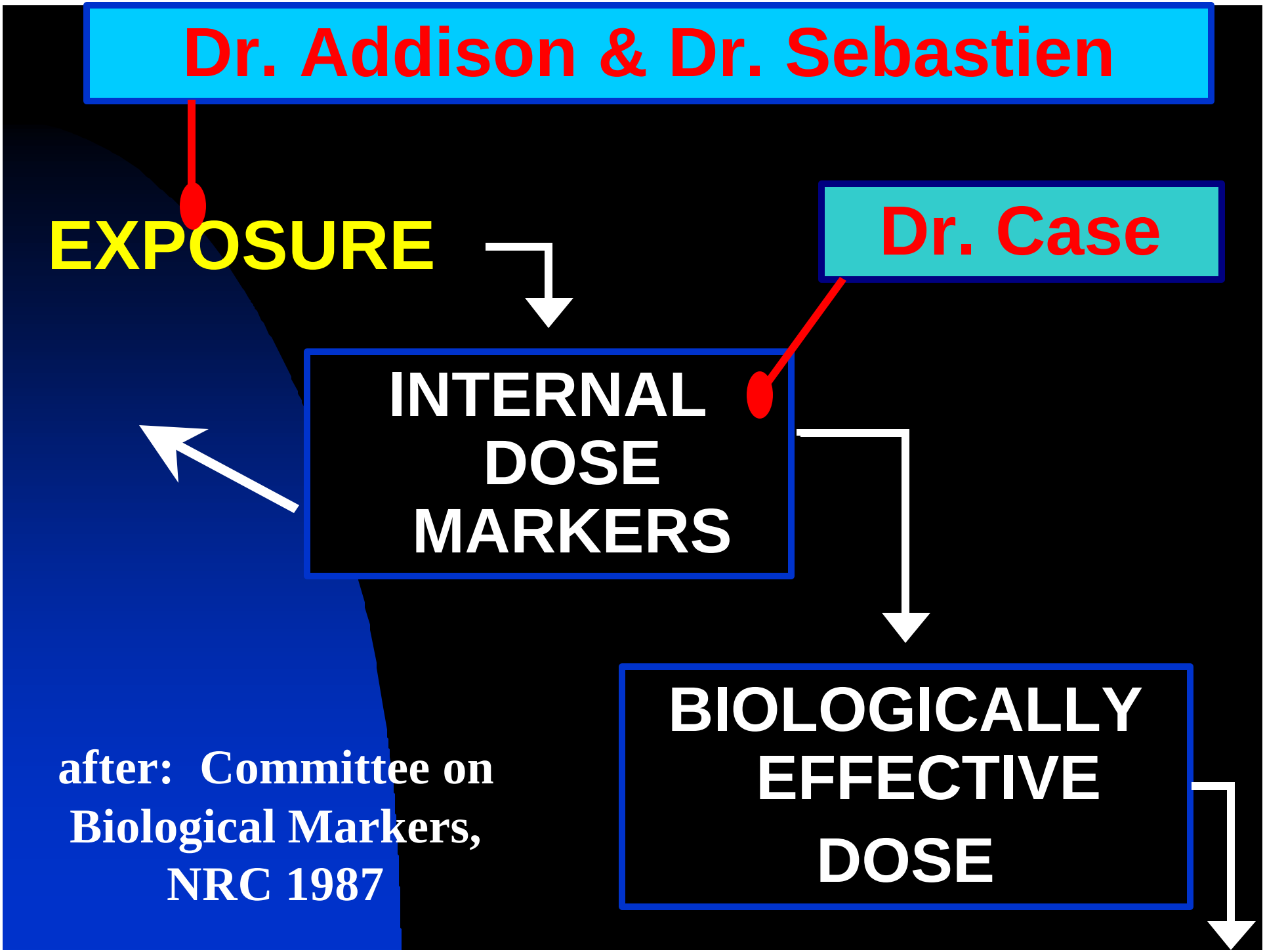


FIGURE 3. - Macrophotographs (X 3) of tremolite (top) and tremolite asbestos (bottom).

1. **What is in the ground?**
2. **What is, or *can be*, *on* the ground and *in the air*?**
3. **What is, or *can be*, in the lung (and how and why does it get there, and what happens to it there, and**
4. ***what happens to US*, after that)**


Dr. Addison & Dr. Sebastien
EXPOSURE
Dr. Case
INTERNAL DOSE MARKERS
BIOLOGICALLY EFFECTIVE DOSE
after: Committee on Biological Markers, NRC 1987

# Putting exposure in perspective: 2